engine, $x_{bl,}$ according to Equation 1036.525–2. If x_b is less than $x_{bl,}$ use the integrated positive work for your emission calculations. If the x_b is greater than x_{bl} use Equation 1036.525–3 to calculate the positive work done over the cycle. Use W_{cycle} as the integrated positive work when calculating brake-specific emissions. To avoid the need to delete extra brake work from positive work you may set an instantaneous brake target that will prevent x_b from being larger than $x_{bl.}$

$$x_b = \left| \frac{W_{neg}}{W_{pos}} \right|$$

Eq. 1036.525-1

$$x_{bl} = 4.158 \cdot 10^{-4} \cdot P_{max} + 0.2247$$

Eq. 1036.525-2

$$W_{cycle} = W_{pos} - \left(\left| W_{neg} \right| - x_{bl} \cdot W_{pos} \right)$$

Eq. 1036.525-3

(ii) The following definitions of terms apply for this paragraph (d)(4):

x_b = the brake energy fraction.

W_{neg} = the negative work over the cycle.

W_{pos} = the positive work over the cycle.

x_{bl} = the brake energy fraction limit.

P_{max} = the maximum power of the engine with the hybrid system engaged (kW).

W_{cycle} = the work over the cycle when x_b is greater than x_{bl}.

(iii) Note that these calculations are specified with SI units (such as kW), consistent with 40 CFR part 1065. Emission results are converted to g/hp-hr at the end of the calculations.

(5) Correct for the net energy change of the energy storage device as described in 40 CFR 1066.501.

§ 1036.530 Calculating greenhouse gas emission rates.

This section describes how to calculate official emission results for CO_2, CH_4, and N_2O.

(a) Calculate brake-specific emission rates for each applicable duty cycle as specified in 40 CFR 1065.650. Do not apply infrequent regeneration adjustment factors to your results.

(b) Adjust CO_2 emission rates calculated under paragraph (a) of this section for measured test fuel properties as specified in this paragraph (b) to obtain the official emission results. You are not required to apply this adjustment for fuels containing at least 75 percent pure alcohol, such as E85. The purpose of this adjustment is to make official emission results independent of differences in test fuels within a fuel type. Use good engineering judgment to develop and apply testing protocols to minimize the impact of variations in test fuels.

(1) For liquid fuels, determine the net energy content (Btu per pound of fuel) according to ASTM D4809 or ASTM D240 (both incorporated by reference in §1036.810) and carbon weight fraction (dimensionless) of your test fuel according to ASTM D5291 (incorporated by reference in §1036.810). (Note that we recommend using ASTM D4809.) For gaseous fuels, use good engineering judgment to determine the fuel's net energy content and carbon weight fraction. (Note: Net energy content is also sometimes known as lower heating value.) Calculate the test fuel's carbon-specific net energy content (Btu/lbC) by dividing the net energy content by the carbon fraction, expressed to at least five significant figures. You may perform these calculations using SI units with the following conversion factors: one Btu equals 1055.06 Joules and one Btu/lb equals 0.0023260 MJ/kg.

(2) If you control test fuel properties so that variations in the actual carbon-specific energy content are the same as or smaller than the repeatability of measuring carbon-specific energy content, you may use a constant value equal to the average carbon-specific energy content of your test fuel. Otherwise, use the measured value for the specific test fuel used for a given test. If you use a constant value, you must update or verify the value at least once per year, or after changes in test fuel suppliers or specifications.

(3) Calculate the adjustment factor for carbon-specific net energy content by dividing the carbon-specific net energy content of your test fuel by the reference level in the following table, expressed to at least five decimal places. Note that as used in this section, the unit lbC means pound of carbon and kgC means kilogram of carbon.

Fuel type	Reference carbon-specific net energy content (Btu/lbC)	Reference carbon-specific net energy content (MJ/kgC)
Diesel fuel	21,200	49.3112
Gasoline	21,700	50.4742
Natural Gas	28,500	66.2910
LPG	24,300	56.5218

(4) Your official emission result equals your calculated brake-specific emission rate multiplied by the adjustment factor specified in paragraph (b)(2) of this section. For example, if the net energy content and carbon fraction of your diesel test fuel are 18,400 Btu/lb and 0.870, the carbon-specific net energy content of the test fuel would be 21,149 Btu/lbC. The adjustment factor in the example above would be 0.99759 (21,149/21,200). If your brake-specific CO_2 emission rate was 630.0 g/hp-hr, your official emission result would be 628.5 g/hp-hr.

Subpart G—Special Compliance Provisions

§ 1036.601 What compliance provisions apply to these engines?

(a) Engine and equipment manufacturers, as well as owners, operators, and rebuilders of engines subject to the requirements of this part, and all other persons, must observe the provisions of this part, the provisions of the Clean Air Act, and the following provisions of 40 CFR part 1068:

(1) The exemption and importation provisions of 40 CFR part 1068, subparts C and D, apply for engines subject to this part 1036, except that the hardship exemption provisions of 40 CFR 1068.245, 1068.250, and 1068.255 do not apply for motor vehicle engines.

(2) Manufacturers may comply with the defect reporting requirements of 40 CFR 1068.501 instead of the defect reporting requirements of 40 CFR part 85.

(b) Engines exempted from the applicable standards of 40 CFR part 86 are exempt from the standards of this part without request.

§ 1036.610 Innovative technology credits and adjustments for reducing greenhouse gas emissions.

(a) You may ask us to apply the provisions of this section for CO_2 emission reductions resulting from powertrain technologies that were not in common use with heavy-duty vehicles before model year 2010 that are not reflected in the specified test procedure. We will apply these provisions only for technologies that will result in a measurable, demonstrable, and verifiable real-world CO_2 reduction.

(b) The provisions of this section may be applied as either an improvement factor (used to adjust emission results) or as a separate credit, consistent with